DOCUMENT RESUME

ED 314 282 SE 051 157

AUTHOR Tanner, Joey
TITLE Paleontology: Self-Directed Study Units for Grades K-3 and 4-8, Gifted. Easily Adapted for Regular Classroom Use. Zephyr Learning Project.
REPORT NO ISBN-0-913705-06-3
PUB DATE 83
NOTE 68p.; For other units in this series, see SE 051 153-162. Adapted from "Paleontology" by Judith Enz and Joey Tanner.
AVAILABLE FROM Zephyr Press, 3865 East 34th Street, Suite 101, Tucson, AZ 85732-3448 (ZP15-R, $16.95).
PUB TYPE Guides - Classroom Use - Materials (For Learner) (051) -- Guides - Classroom Use - Guides (For Teachers) (052)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS Earth Science; Elementary Education; *Elementary School Science; *Gifted; Instructional Materials; Interdisciplinary Approach; Junior High Schools; *Middle Schools; *Paleontology; *Science Activities; Science Education; *Secondary School Science

ABSTRACT

Originally designed for gifted students, these reproducible paleontology units emphasize the use of higher order thinking skills and are appropriate for use in any classroom. Interdisciplinary in content, the units provide a broad view of paleontology. Included are two complete units, one created for the upper elementary gifted student and the other for the lower elementary gifted student. Suggestions for adapting the materials to fit other classrooms are included. Several learning modalities are designed into the materials to encourage active student participation. (CW)

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Zephyr Learning Packets

PALEONTOLOGY

A SELF-DIRECTED LEARNING EXPERIENCE
Interdisciplinary – Product Oriented
Grades K – 8

SE 051 157

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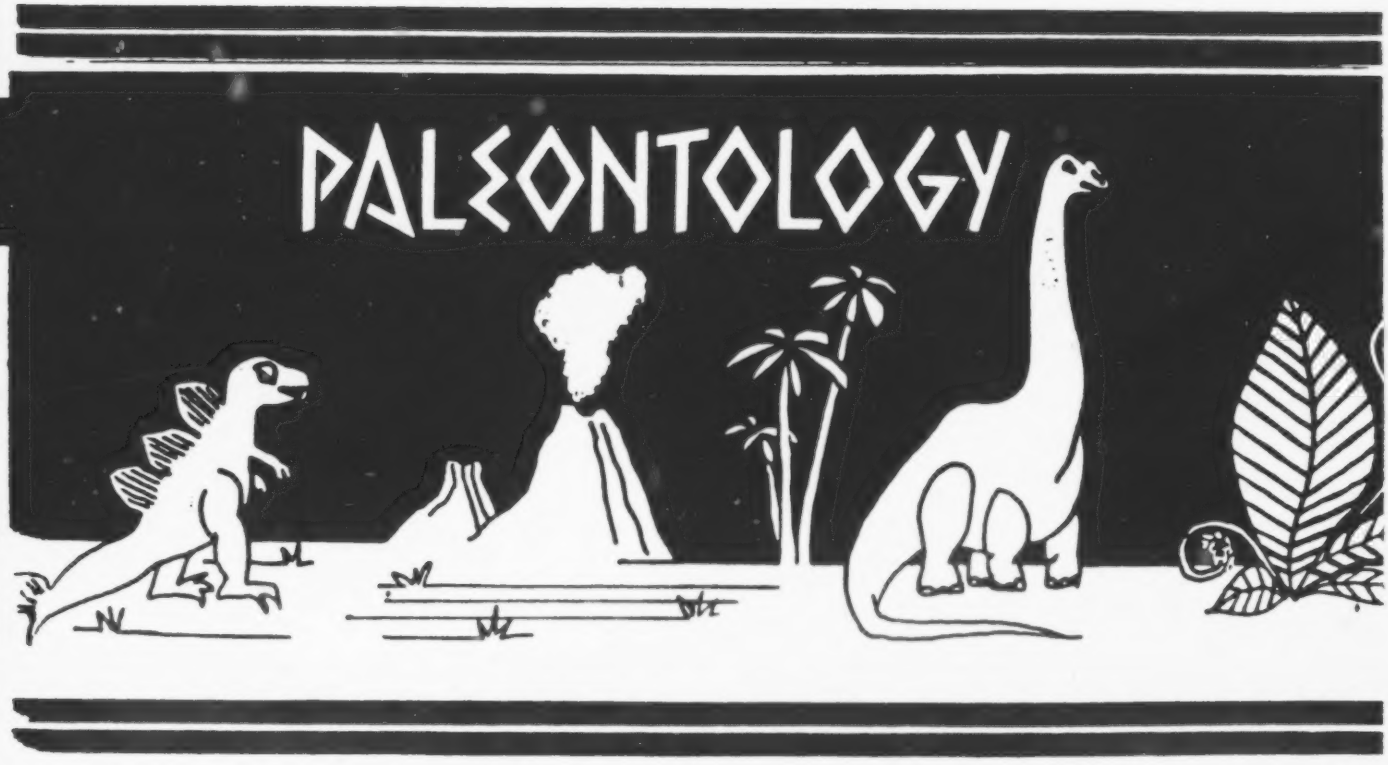
Zephyr Learning Packet



A self-directed unit promoting CRITICAL and CREATIVE THINKING while researching the age of the dinosaur.

Reproducible Units Grades K–3 and 4–8

PALEONTOLOGY:

Self-Directed
Study Units
for grades
K-3 and
4-8, gifted

easily adapted for
regular classroom use

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by Judith Enz and Joey Tanner
ZEPHYR PRESS
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ISBN 0 913705 06 3
ISBN 0 913705 22 5 (Set)

Illustrations: Suzanne Adams
Book Design: Penny Rebholz

Printed in the United States of America

PALEONTOLOGY:

by Joey Tanner

Self-Directed Study Units for grades K-3 and 4-8, gifted

easily adapted for regular classroom use

Interdisciplinary and
Product Oriented
through the use of:

- Evaluating
- Classifying
- Comparing
- Imagining
- Researching
- Mapping & Charting
- Creating
- Reporting
- Thinking...Reacting
- Career Exploration

ZEPHYR PRESS
TUCSON, ARIZONA

ZEPHYR PRESS
P.O. Box 13448
Tucson, AZ 85732-3448
(602) 745-9199

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THE PREMISE

CHILDREN ARE ACTIVE PARTICIPANTS IN THEIR LEARNING, NOT PASSIVE VESSELS TO BE FILLED. THEY ARE ALWAYS SEEKING AND CHOOSING WHAT THEY WILL LEARN AND WHAT THEY WILL NOT LEARN. THEIR ACTIVE INVOLVEMENT IS CRUCIAL TO LEARNING. CHILDREN TEND TO BECOME PERSONALLY INVOLVED IN PROJECTS THAT APPEAL TO A VARIETY OF MODALITIES . . . READING, WRITING, BUILDING, CREATING, IMAGINING, AND REAL THINKING . . . SO A VARIETY OF EACH IS INCLUDED IN THIS SELF—DIRECTED LEARNING UNIT.

A WORD TO THE TEACHER

PALEONTOLOGY

"PALEONTOLOGY, (*palaios*, Greek meaning ancient), the study of ancient organized things, now extinct; specifically the study of fossils, that is, plants and animals whose remains have been preserved in rocks, and their biology." — Webster's Dictionary.

Much more than learning about the dinosaur or the excitement of finding a fossil, the study of paleontology is the story of the beginnings of natural history . . . the tracing of the first living creatures for millions of years up to the Age of Man. From creatures too simple to classify as plants to the warm-blooded mammals that outlived the dinosaur, the remains of the past tell the story of mankind.

The paleontologist devotes his/her life in the endless puzzle of finding missing pieces. Pieces that may be a link in the thread of understanding from our origins to the meaning of life today. Pierre Teilhard de Chardin, the often-quoted paleontologist of the early 20th century, speaks of this thread of "something greater and more indispensable than ourselves: something that existed before we did, and could have continued to exist without us . . . .", in his book, *Building The Earth*. The study of paleontology, then, may provide more than an "interesting" prehistoric view of the process of life on this planet. Within the ancient digs of our earth may remain a hint of the meaning of the universe.

"ONE CAN LEARN THE CAMPAIGNS OF THE CIVIL WAR WITH DATES, BATTLES AND CHARACTERS WITHOUT LEARNING ANYTHING ABOUT WHY WARS ARE FOUGHT BETWEEN FRIENDS OR WHAT IDEAS CAN BE GENERALIZED TO OTHER CONFLICT SITUATIONS."

James Gallagher,
Teaching the Gifted Child, 1974

RATIONALE FOR SELF-DIRECTED LEARNING

Our children's education must be more than the memorization of capitols of the states, the products of countries and the dates and places of past wars. Most teachers and parents would agree that what is also wanted is for children to learn to think for themselves, to organize their own time, to make wise choices, to work independently and to thoughtfully evaluate the results of their study.

OBSTACLES TO INDEPENDENT LEARNING

In spite of the teacher's best efforts, many, if not most, classroom settings are organized in such a way that students are involved in schedules and organizational plans that foster dependence rather than the independence we prefer. Students are told what is to be learned, how long it will take them to learn it, the resources are defined by the teacher and, afterwards, the teacher rather than the student decides whether the learning experience was a satisfactory and valuable one.

A LEARNING ATMOSPHERE

Each time we, as educators, focus on what our objectives are, we need to take a fresh look at our classroom mode of operation and evaluate the effectiveness of the way we teach. Quite naturally, for most of us, our teaching style has more to do with how we were taught than with what recent research has shown about the learning process. Even our good instincts have been overcome by the years of conditioning we have known in our own educational experiences.

Like a breath of fresh air, the recent findings coming from the research on the brain and how it operates are supporting our intuitive knowledge. This research is showing that our brains are receptive to learning only under certain conditions. Our job is to translate that information into a classroom atmosphere that provides:

- challenge
- freedom within structure
- trust and warmth
- opportunities to experience success
- personal involvement in the curricula

A natural transition generally occurs that transforms the former "teacher-lecturer" into a "fellow-learner". As a "fellow-learner" the teacher's role becomes one of a resource person, a facilitator and a classroom manager. In this maturing atmosphere, students gradually come to see themselves as responsible for their own learning and a foundation for self-direction is set.

• • •

At this point, a sometimes unexpected problem arises. We find the student no more ready for their independent learning than we, as teachers, were ready to allow it. This common occurrence is mentioned repeatedly in the literature dealing with programming for the gifted, an area where independent study and research are recommended as a major curricular activity (see **Suggested Reading List:** Maker (1982), Doherty & Evans (1980), and Feldhusen and Treffinger (1980).

FROM PASSIVE LEARNER TO ACTIVE PARTICIPANT (BRIDGING THE GAP)

The **ZEPHYR** self-directed study unit was developed expressly to bridge that gap . . . to transport the student from the position of passive recipient to that of an active participant in his/her own pursuit of knowledge.

Within the defined structure of each unit, the students are given opportunities to:

- make choices
- learn at their own pace
- learn in a manner more closely suited to their own learning style
- expand research skills
- use a variety of modalities
- plan their own time
- develop the skills of creative, critical and evaluative thinking
- experience whole-brain learning

Since responsibility for directing their own learning is so often an unfamiliar situation, the students will need your encouragement at the start. Generally, within six to nine weeks, most students will be well on their way from teacher dependence to self-motivation. (Beginning the venture with only a few choices, then gradually arranging the setting so that there are more and more choices, works best.) As students assume more responsibility, many teachers begin to consider the school library as just another part of the classroom . . . the benefits are many . . . from gaining a personal relationship with the librarian to learning about the enormous resources available, but often unused, in most school libraries.

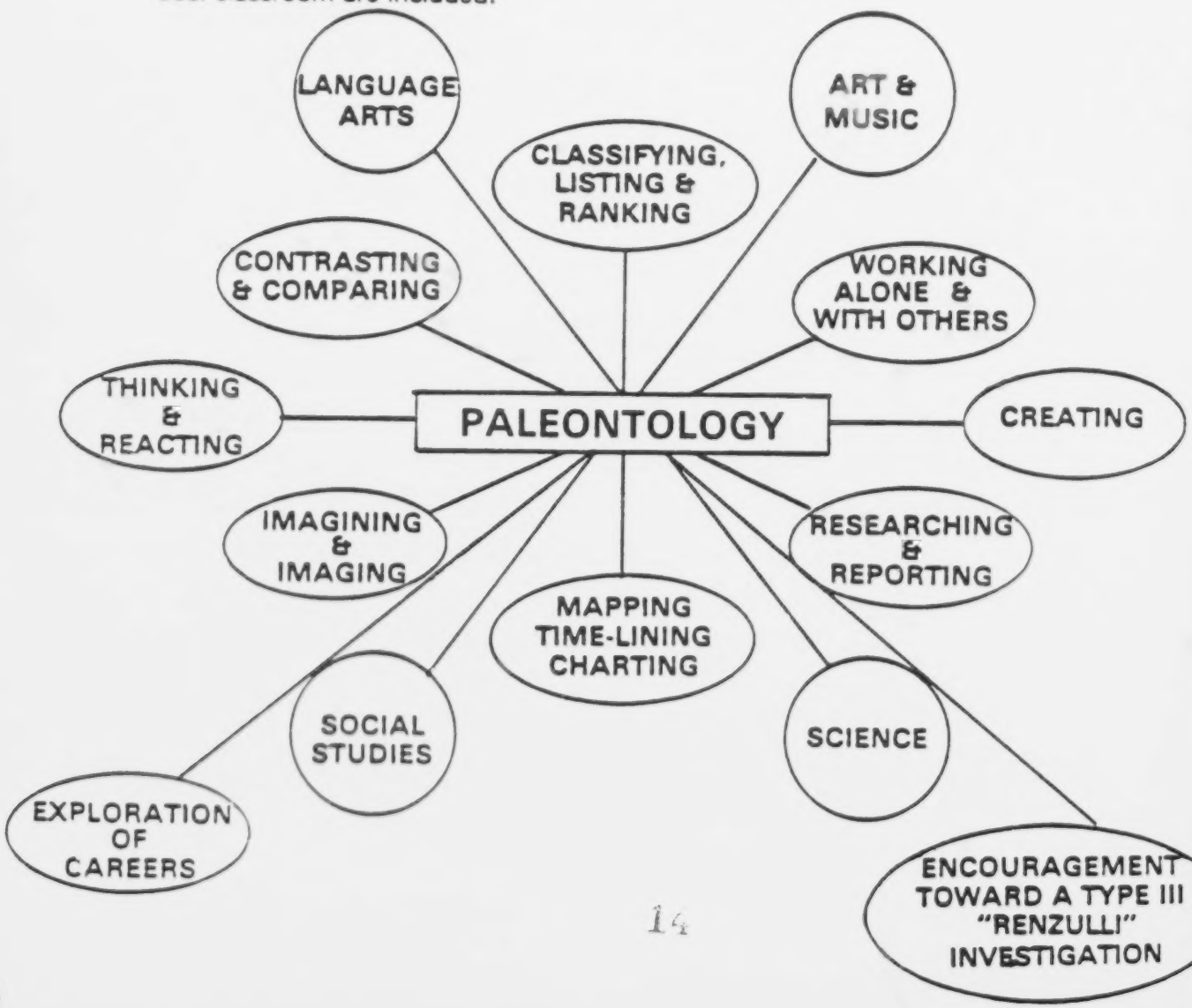
Eventually, a few students will be ready for a true investigative research study of professional quality as suggested by Joseph Renzulli in **The Enrichment Triad Model, A Guide for Developing Programs for the Gifted and Talented**, 1977.

THE FORMAT

Originally developed for the gifted student, these units emphasize the use of the higher level thinking skills . . . and are appropriate for use in any classroom where the goal is to encourage students to become responsible for their own education.

Interdisciplinary in content, the unit envelopes a broad view of the topic by integrating the "basics" into each activity.

Within this book are two complete units, one created for the upper elementary gifted student and the other for the lower elementary gifted student. Suggestions for adaptations for adjusting either of the levels to fit any individual classroom are included.



SUGGESTED READINGS

SELF-DIRECTED STUDY

"Bells, Groups and Independent Study", **Psychology and Education of the Gifted.** Barbe, W. and Renzulli, J. New York, 1975. Irvington Publishers.

Creative Questioning and Sensitive Listening Techniques. Carin, A. and Sund, R. Columbus, Ohio, 1978. Charles Merrill Publishing Company.

Creative Thinking and Problem Solving in Gifted Education. Feldhusen and Treffinger. Dubuque, Iowa, 1980. Kendall-Hunt Publishing.

Curriculum Development for the Gifted. Maker, C.J. Rockville, Maryland, 1982. Aspen Systems Corporation.

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Growing Up Gifted. Clark, B. Columbus, Ohio, 1978. Charles Merrill Publishing Company.

Inviting School Success, A Self Concept Approach to Teaching and Learning. Purkey, W.W.. Belmont, California, 1978. Wadsworth Publishing Company, Inc.

Open to Change: Options for Teaching Self-Directed Learners. Malehorn, H. Palo Alto, California, 1978. Scott Foresman Company.

Self Starter Kit for Independent Learning. Doherty and Evans. Austin, Texas, 1980. Special Education Associates.

Teaching the Gifted Child. Gallagher, J. Boston, Massachusetts, 1975. Allyn and Bacon.

INTEREST DEVELOPMENT CENTER

PALEONTOLOGY

THE PURPOSE OF THE INTEREST DEVELOPMENT CENTER IS TO STIMULATE INTEREST IN THE TOPIC AREA. THE STUDENT NEEDS TIME FOR BROWSING AND INVESTIGATION FOR MAXIMUM BENEFIT.

(Beginning ideas . . . . . you and your students will think of more . . . . . let parents and other teachers know about the Center and it will many times grow without effort.)

BOOKS, FILMSTRIPS, POSTERS:

FOSSILS
GEOLOGY
DINOSAURS
GLACIERS
VOLCANOES
PALEONTOLOGISTS
THE FIRST FISHES, REPTILES AND PLANTS
ARCHAEOLOGISTS
PREHISTORY
CREATION MYTHS & LEGENDS
ROCK STRATA
EARLY TOOLS
EARLY MAN
EXTINCTION

PAMPHLETS FROM NATURAL HISTORY MUSEUMS

MODELS, STUFFED ANIMALS OR TOY DINOSAURS

REAL OR MAN-MADE FOSSILS

A TIMELINE OF THE HISTORY OF THE WORLD

SONGS AND RECORDINGS ABOUT DINOSAURS

NATIONAL GEOGRAPHIC MAGAZINES
RELATED JOURNALS

I HEAR ..... AND I FORGET
I SEE ..... AND I REMEMBER
I DO ..... AND I UNDERSTAND
(source unknown)

GETTING STARTED

1. **Select a topic** as an extension of a regular curricular subject (particularly when your class seems to crave more) . . . or . . . select a topic to pursue that is of particular interest and may not be part of the curricula. To zero in on special interests, administer an interest survey to each student.

2. **Copy the unit for each student.** When using these units for the entire class you may want to expand or delete activities for individual students.

3. **Set up a center** in the classroom that encourages exploration in the subject field. You'll want to include a wide variety of materials. Be creative, the purpose of the center is to excite the student in this subject area so begin with lots of "hands on" materials . . . . allow for ample browsing time and encourage the student to investigate and become absorbed . . . . at the level of a true professional.

. With the students, go over each activity in the unit, discussing and answering any questions. The teacher is an integral key in successful implementation. Because most children are already well-versed in the "One Right Answer Game", they will need encouragement to branch out into many of the open-ended activities in the packets.

5. **Set the stage** . . . plan to **conference as needed** . . . . **provide resources as needed** . . . . then **get out of the way** and let your students learn.

6. **Give as much time** as each student needs to complete each activity in the unit. The entire packet might take from five to ten weeks or longer.

7. As each activity is completed and evaluated, **initial the symbol** located near each activity number. You will want to **evaluate** on the basis of what response is appropriate for **that student.**

8. When a student shows an extreme interest in the topic, the completion of this unit might be only the beginning. This student may well be ready for further study and research and **needs** only the **resources, guidance and freedom** to pursue his/her well-planned project.

In preparation for further research, the student will need to decide:

WHAT WILL THE STUDY BE? (what will be investigated and produced)

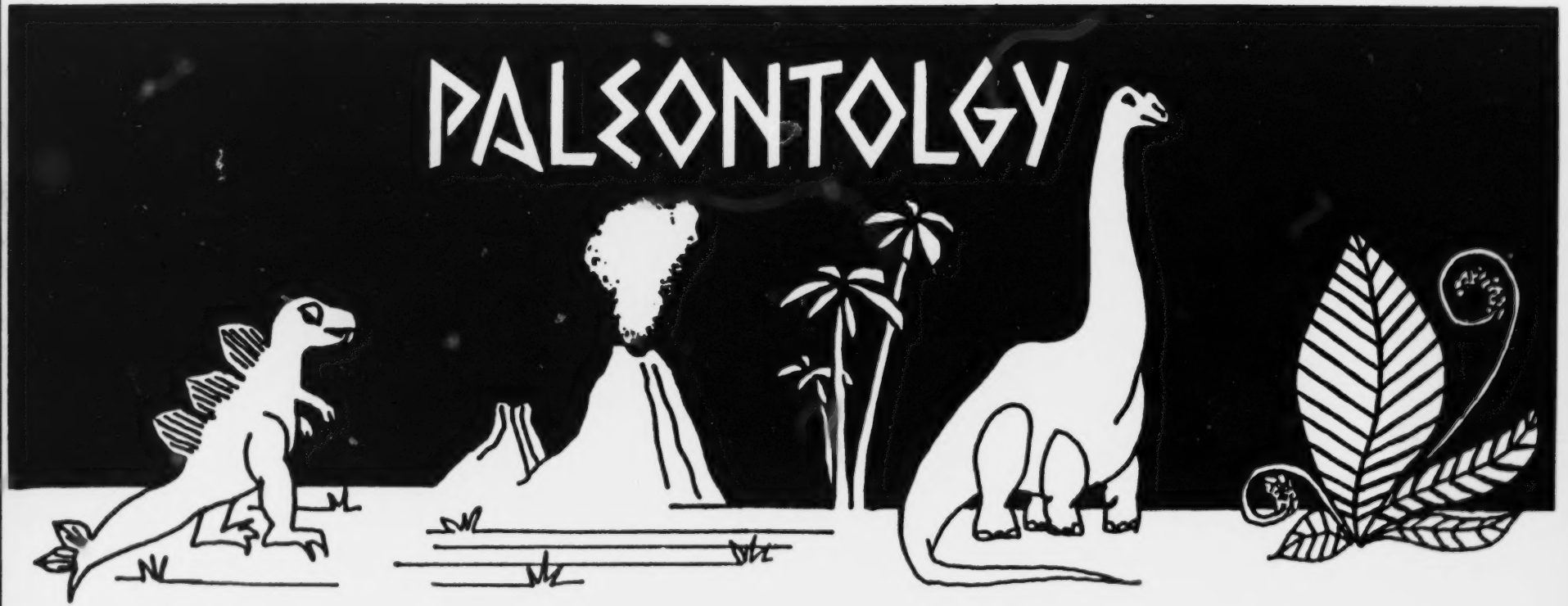
WHERE WILL BACKGROUND INFORMATION BE FOUND? (i.e., speakers, interviews, books, films, microfiche, documents, etc.)

WHAT, EXACTLY, WILL BE THE FORM OF THE PRODUCT? (a model, a manuscript, or . . .)

WHO MIGHT BE INTERESTED IN THE PRODUCT? (professionals in the field, publishers, organizations, etc.)

WHAT IS NEEDED TO BEGIN? (specific plans, resources, deadlines . .)

AGAIN . . . STEP BACK . . . PROVIDE GUIDANCE . . .
and LET HIM/HER GO!



UNIT I

NAME _____

DATE _____

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RESEARCH

1.

For the Record.....

Largest Dinosaur _____

Smallest Dinosaur _____

Most Unusual _____

ADD SOME OTHER FACTS _____

_____

_____

_____

2. INVESTIGATE

Find out the names of five to ten different dinosaurs. Then find out the dates when they were living.

Make a card for each dinosaur and write the name on the front and the date on the back.

Tell your class or some friends about the cards. See who can put the cards in order by date . . . without looking. (you try it first!)

3. CONTRAST & COMPARE

Choose two dinosaurs.
Then find out what is alike and what is different.

			Alike	Different
Dinosaur Name	_____	_____	_____	_____
Size	_____	_____	_____	_____
Diet	_____	_____	_____	_____
Habitat	_____	_____	_____	_____

STUDY›THINK

Find out why the dinosaur is extinct.
Make a chart or bulletin board display to show what happened.

OR

Find out abut mammals and birds during the time of the dinosaur.
Show what you learned in a mobile or mural.

THE PALEONTOLOGIST

Find out about a paleontologist.
Where did he or she live?
What did he or she find?
Make a book showing the story.

6. JUST IMAGINE

Imagine that you are transported in a time machine to the time of the dinosaurs. You see your first animals!

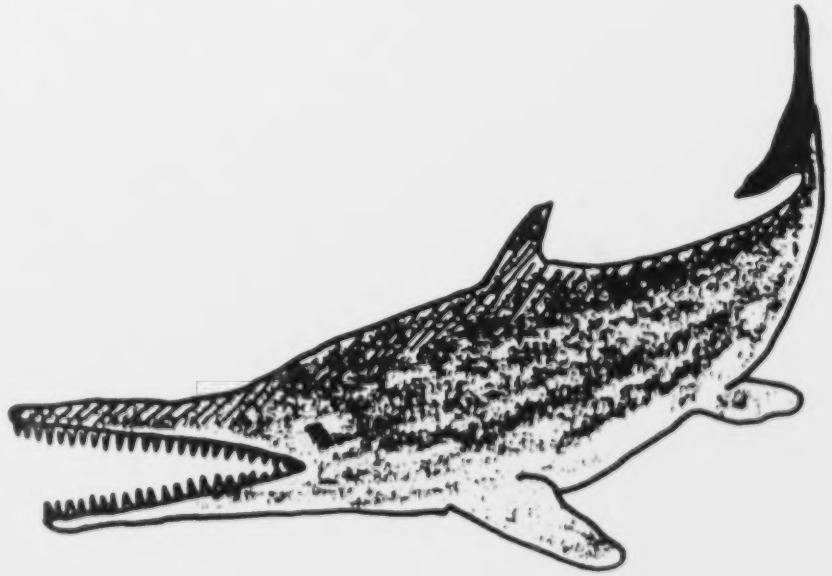
What do you feel?

What do you hear?

What do you smell?

What do you see?

What do you say?

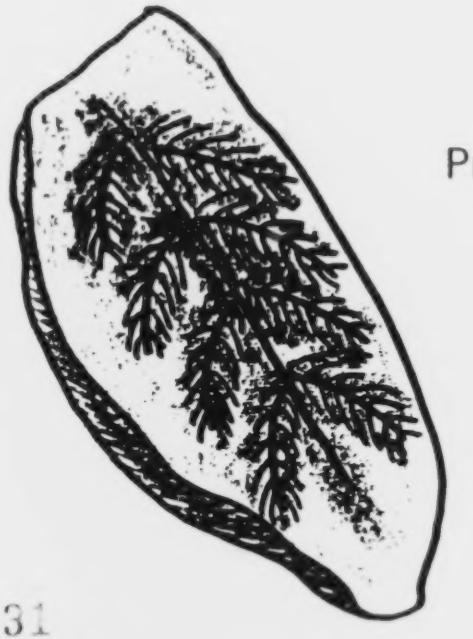


Write a story about it.

7. WITH SOME FRIENDS

PICK ONE

- **Draw or paint** a mural of the land of dinosaurs. Label the dinosaurs with their scientific names.



- Using thick mud or plaster of paris, **make your own fossils.**

Put wet mud or plaster of paris into a paper plate.

Press in an object like a bean or shells or something else . . .
Let it almost dry . . . then take out the object.

Set up a museum.

Label the "pretend" fossils.

OR BY YOURSELF

VOCABULARY

8. What do they mean?

DINOSAUR _____

_____

FOSSIL _____

_____

PALEONTOLOGIST _____

_____

HABITAT _____

_____

MUSEUM _____

_____

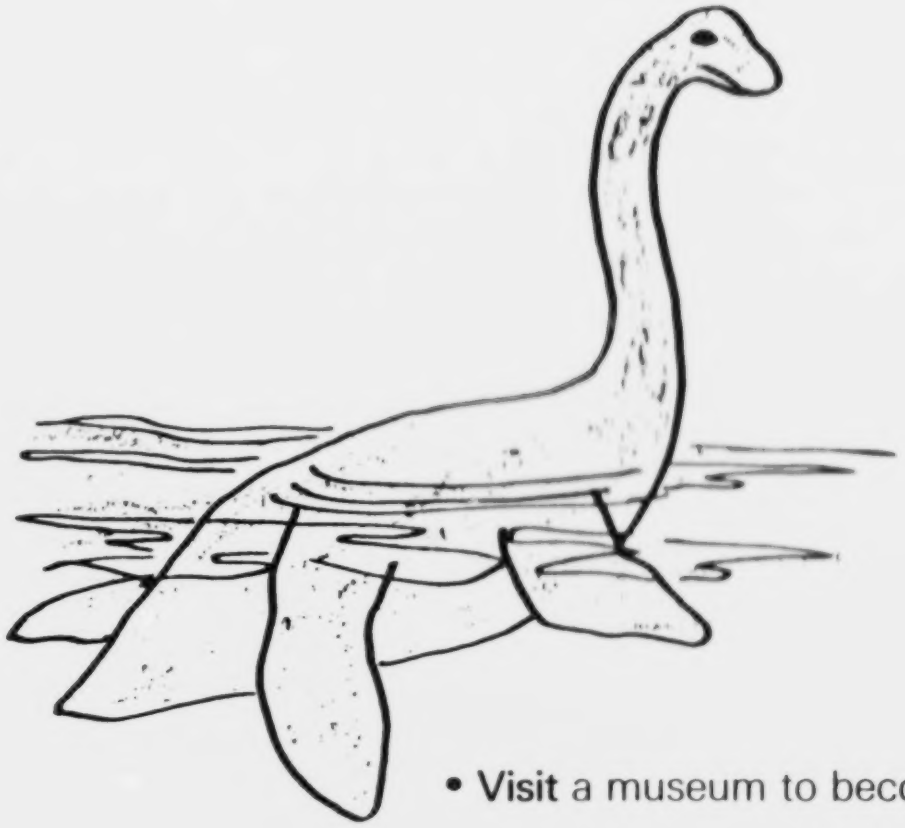
PERIOD _____

_____

EXTINCT _____

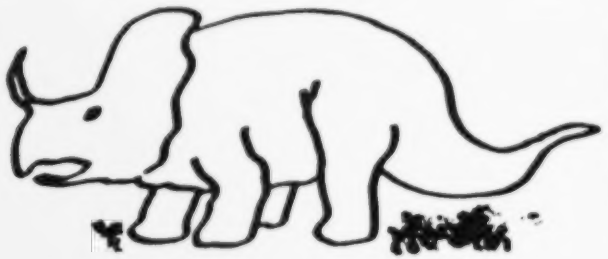
9. LEARN SOME MORE

• **Invite** a paleontologist to speak to your class.



• **Visit** a museum to become familiar with the **Mesozoic Era**.

10. WORD GAMES



Create a seek-and-find or crossword puzzle
using dinosaur names.
Make copies for your friends.

OR

List the names of *all* dinosaurs with a brief description.
Make a game, using the names and descriptions.

SUGGESTIONS FOR ADAPTING THE UNIT TO YOUR PARTICULAR TEACHING-LEARNING SITUATION

1. Require fewer, or more, research sources.

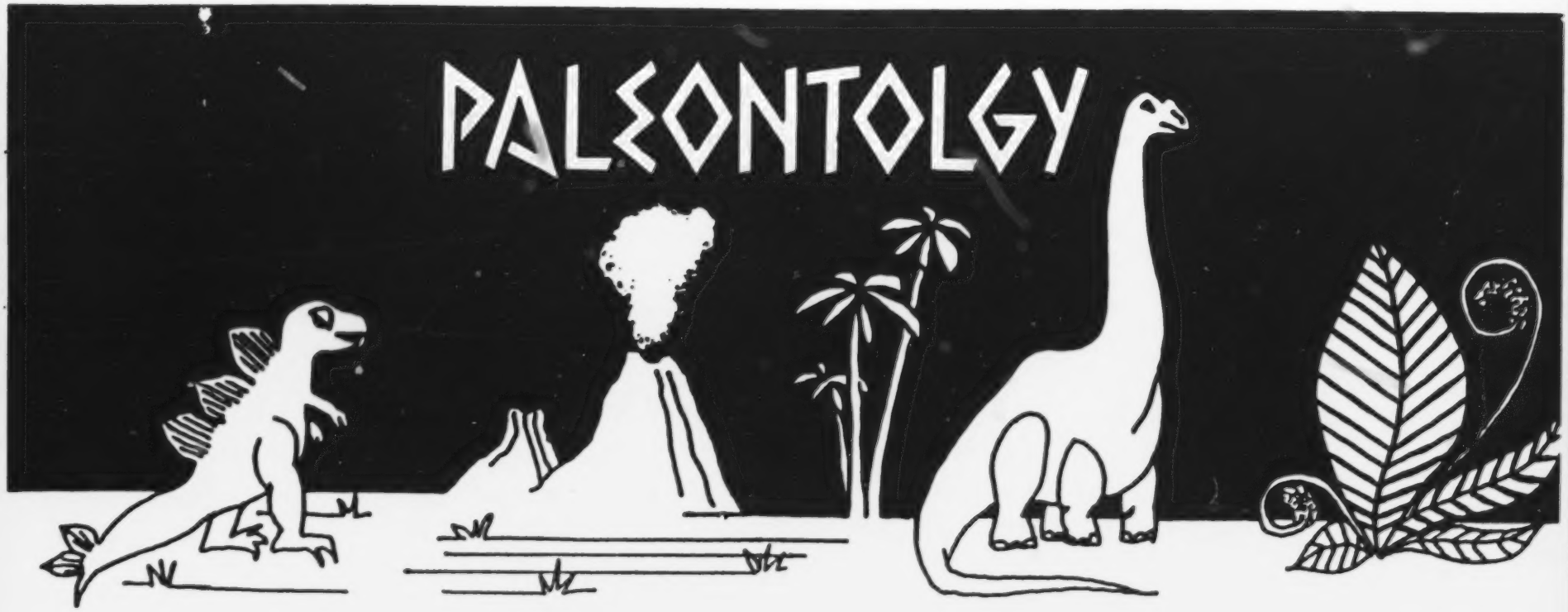
2. Assign more of the activities to small groups instead of to individual students.

3. Give fewer or more choices.

4. Delete some activities altogether.

5. Arrange the unit to be a class project with students choosing different parts to complete.

6. Add some activities of your own.



UNIT II

NAME _____

DATE _____

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1. RESEARCH

For the Record:

Largest Dinosaur _____

Smallest Dinosaur _____

Fiercest Dinosaur _____

Brain Size _____

Shortest Lived _____

Longest Lived _____

Most Unusual _____

Most Recent _____

First Dinosaur Fossil Found _____

ADD SOME OF YOUR OWN

_____ _____

_____ _____

_____ _____

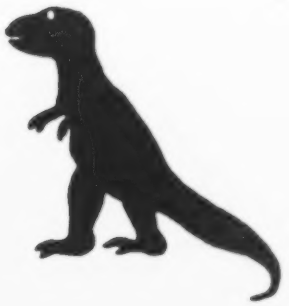
_____ _____

_____ _____

CHOOSE ONE

2. INVESTIGATE

- Using a long strip of paper, such as wide adding machine tape, **make a time line** for the last 5 billion years. Show the different time periods and the type of life (plant and animal) in each.



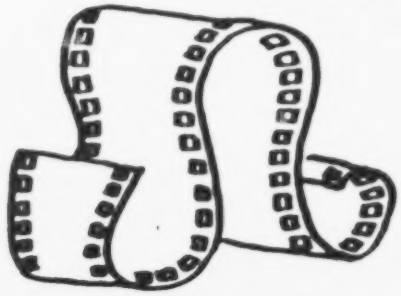
- Some scientists believe there are two main orders of dinosaurs — **saurischian** and **ornithiscian**. **Make a family tree** of dinosaurs based on these.

- **Where** would you search for dinosaur remains? Why? Make a map showing the major finds . . . so far.

- **Create** a mobile or chart of the animal life during the **Paleozoic Era**. Label the animal and the time period.

- **Investigate** the rise and decline of the dinosaur. Why...How...When??? Make a filmstrip and tape showing of your findings (on a time line or . . . .)

(your choice)



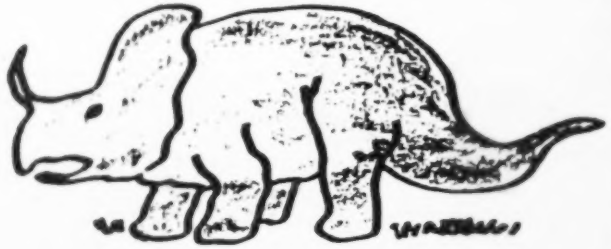
CREATE

CONTRAST

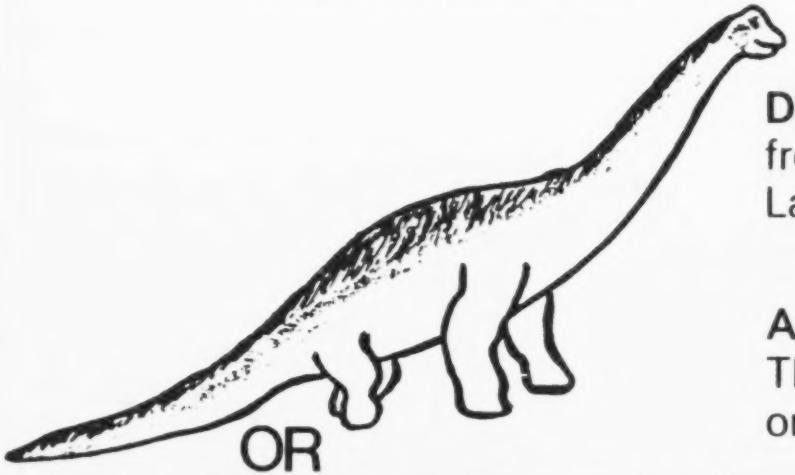
3. **Research** at least three dinosaurs.

OR

Research diplodocus or Tyrannosaurus Rex and a Gila Monster or a Komodo Dragon.



Make a chart or booklet comparing them . . . size, life span, habitat, period, intelligence, diet, etc.
What qualities do they have in common?
What differences are there?



OR

Design a mural showing the differences in animal life from the Cambrian to the Carboniferous Periods. Label each animal.

OR

Arrange and present a debate.
The subject is: "Dinosaurs — Warm or Cold-Blooded Animals?"

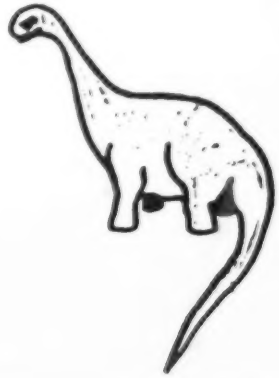
OR

Create a filmstrip or write an article describing the differences in the mammals of the Cretaceous Period.

COMPARE

4. What's In A Name?

Dinosaurs' names have meanings!
Find the meaning of at least five dinosaur names.



5. The PALEONTOLOGIST

Research the life and work of two paleontologists.
Use someone from the following list . . . or any other you find.

Dr. Theodoro White
Dr. Roy Chapman Andrews
Dr. John Ostrom
Mary Anning
Dr. Walter Granger
Professor O.C. Marsh
Dr. Barnum Brown
Sir Richard Owen

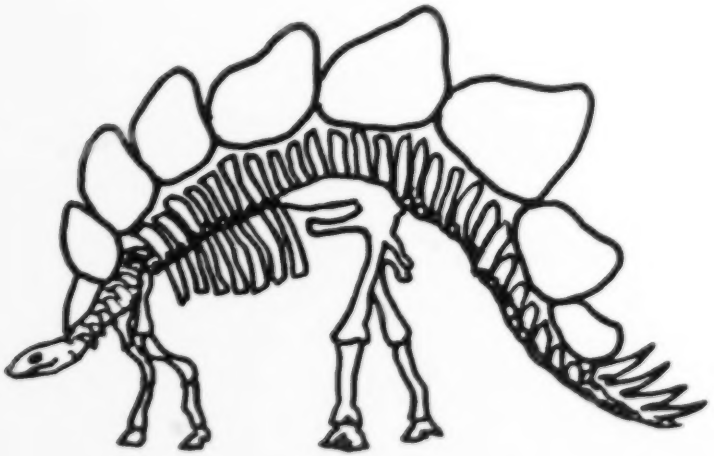
48

AND...

Discover what this person has contributed to the field of paleontology. Would you like to have worked with this person? Why? Compare their childhood, their education and their career experiences.

Present your ideas by:

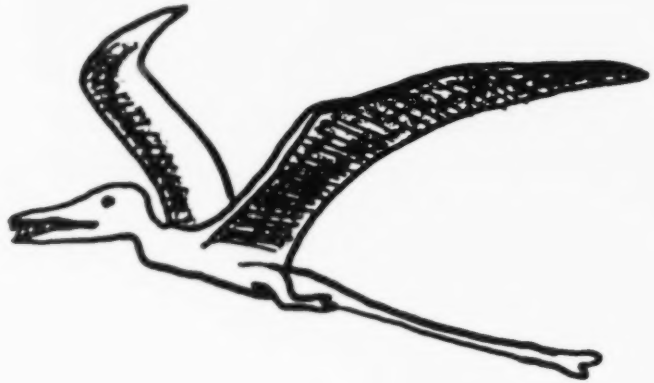
- ☐ Writing a news article
- ☐ Making a speech
- ☐ Creating a filmstrip
- ☐ (your own idea)



6. CAREERS

- **Imagine** that you are a paleontologist and have made your very first paleontological discovery. Prepare a scientific symposium about your discovery.

- **Imagine** that you are presenting career possibilities to a group of high school seniors. Contrast and compare the education required and general job description of the paleontologist, the geologist, and the archaeologist.



- **Imagine** that you are a newspaper reporter transported back to the **Mesozoic Era**. You are the first human to see the animals of the time. Write a front page article for the newspaper back home about your unusual findings.

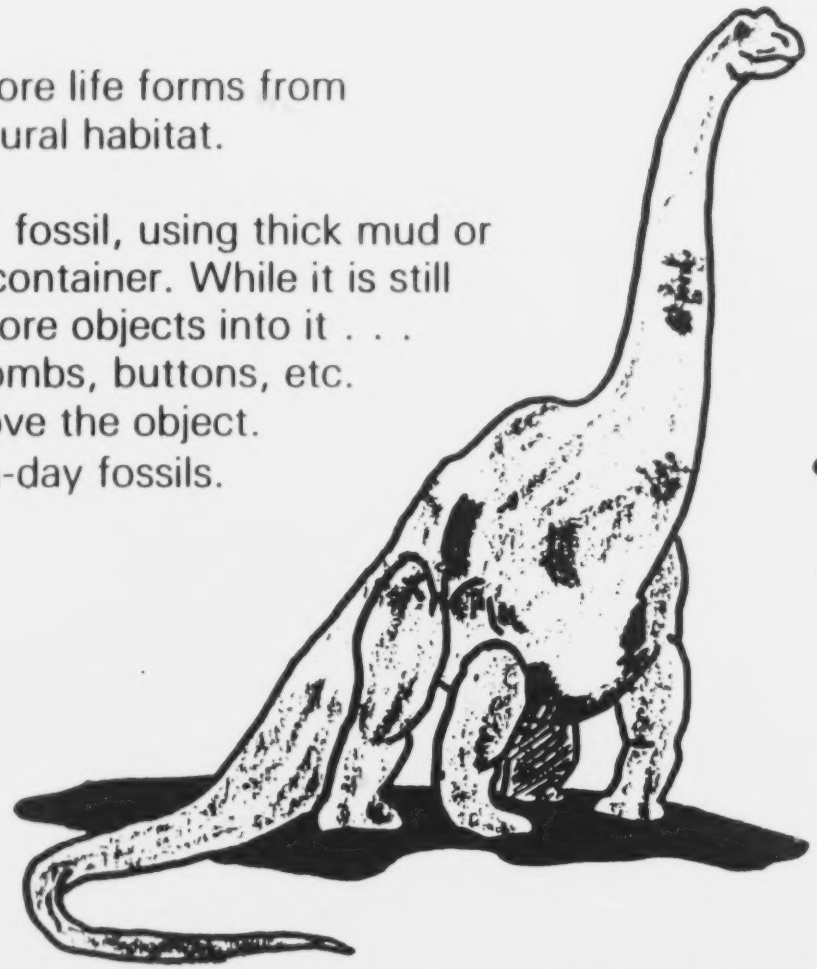
  Keep a journal of your amazing expedition for a national magazine.

CHOOSE ONE

7. ARTS, CRAFTS

- **Make** a diorama of one or more life forms from the Paleozoic Era in their natural habitat.

- **Make** your own "Year 2000" fossil, using thick mud or plaster of paris in a shallow container. While it is still wet and soft, push one or more objects into it . . . rocks, seashells, leaves or combs, buttons, etc. Let it almost dry...then remove the object. Set up a museum of modern-day fossils.



- **Make** a model of a dinosaur.

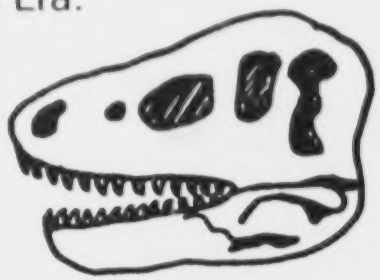
CHOOSE ONE

8. DIG DEEPER

Visit a museum to become familiar with the Paleozoic Era.

OR

Invite a paleontologist to speak to your class.



9. GROUP PROJECTS

- **Make** a chart of the birds of the Mesozoic Era.

- With some friends, or the whole class, **create a dinosaur land mural**. Label each dinosaur with its scientific name.

10. WORD GAMES

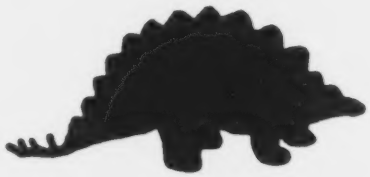
Create a seek-and-find or crossword puzzle using names of the first reptiles. Make copies for your friends.

OR

List the names of *all* dinosaurs with a brief description. Make a game using the names and descriptions.

11. JUST FOR FUN

- **Read** a fiction book that takes place, at least in part, during the **Mesozoic Era**.



- **Put together** a collection of dinosaur jokes and riddles. Ask your librarian to help you search. (Be sure to create some of your own.)

THINK IT THROUGH

12. **Consider** the climate and vegetation of the habitat of any dinosaur. Locate a comparable spot on earth today with that same climate. Could dinosaurs live there? Make a scientific prediction based on what you have learned about where and how dinosaurs lived.

What would be different about the dinosaur's life?

What would be the same?

Cite your references.

OR

Research to find at least one theory as to why dinosaurs are extinct.

React to that theory based on what you have learned about dinosaurs.

Do you agree or disagree?

Cite your references.

PALEONTOLOGY

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PLACES TO VISIT

American Museum of Natural History, New York City

Chicago Museum of Natural History, Grant Park, Chicago, Illinois

Dinner Museum of Natural History, City Park, Denver, Colorado

Los Angeles County Museum, Exposition Park, Los Angeles, California

Peabody Museum of Yale University, New Haven, Connecticut

Exploring The Arts

an opportunity to integrate art experiences within an academic content area.

by
Stephany Grassinger

While each component . . . the self-directed learning unit and Exploring the Arts . . . is a complete and valid learning experience in itself, together they provide a more comprehensive and lasting educational experience for the learner.

PALEONTOLGY

INVENT a dinosaur of your own. Compile important information as if you had made the discovery yourself.

Note the: size
color
texture
shape
habitat
diet

Then . . .

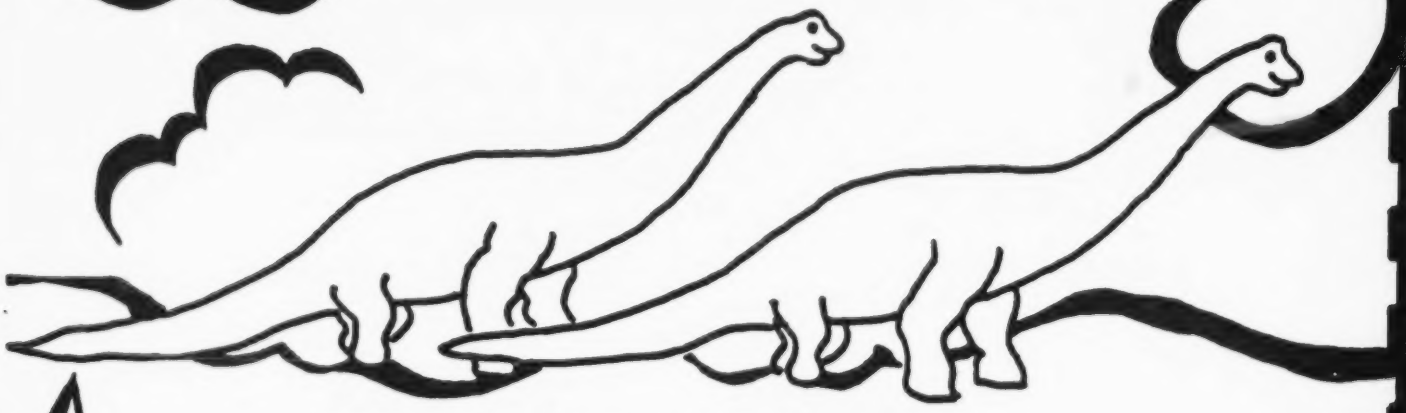
PLAN a chart displaying this information. **PREPARE** sketches of your dinosaur showing the front, back, and side views.

DESIGN a picture of several dinosaurs. **Arrange** them in your composition in an interesting way. **Create** the illusion of depth by making the dinosaurs different sizes. **Include** the environment around your animals.

DINOSAUR SCULPTURE

COLLECT some photographs or a model of a dinosaur. **MAKE SKETCHES** of these photographs, making sure your sketches show the dinosaur from six different angles. Make the sketches as accurate as possible. **Mount** your drawings on a bulletin board to give a visual report of the structure of the dinosaur.

CONSTRUCT an armature (a form) of your dinosaur out of newspaper, cardboard, etc. **Papier-mache** over this form. **Paint** and decorate it when the papier mache is *completely* dry.



CREATE a dinosaur totem with clay.

Create from four to six dinosaurs with moist clay. **Stack** or connect them in some way to make a grouping or totem. Vary the size and shape of each animal. **Texture** the clay in different ways for interesting surface treatments.

(Important — Check your sculpture from all sides to create more interest!)

If it is possible, ask your teacher to fire your clay totem in a kiln. Paint it with a ceramic glaze.

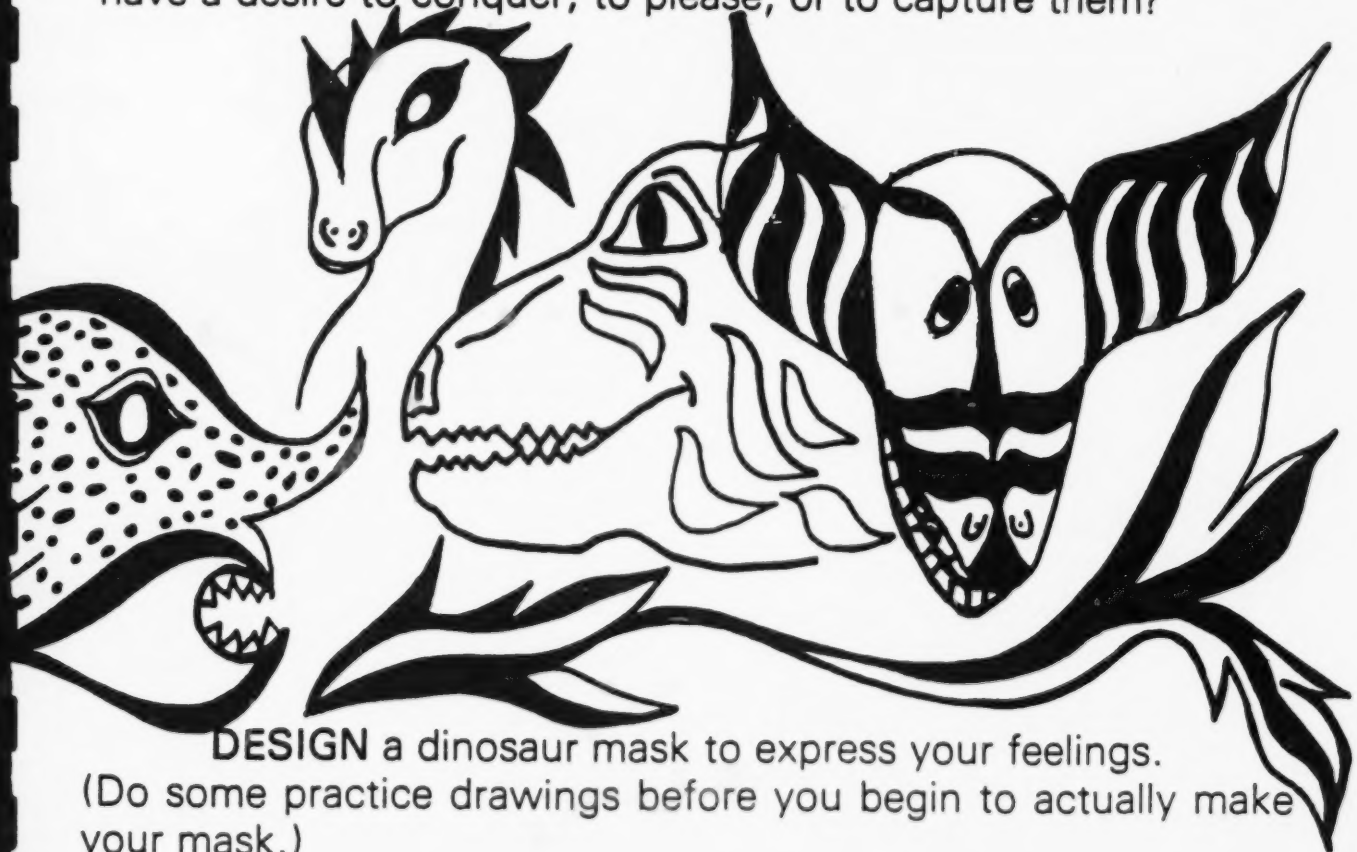
OR

Paint your totem with school paint. But . . . be careful. Unfired clay is very fragile.

DINOSAUR MASKS

Many cultures around the world express their beliefs and feelings about animals through the making of masks. The animal masks of the Pacific Northwest Coast Indians are good examples. Study some masks you find in library books.

Imagine how it would be to be living in the world today with dinosaurs. How would you feel about them? Might you worship the dinosaur because of its size? Would you feel fear, reverence, have a desire to conquer, to please, or to capture them?



DESIGN a dinosaur mask to express your feelings. (Do some practice drawings before you begin to actually make your mask.)

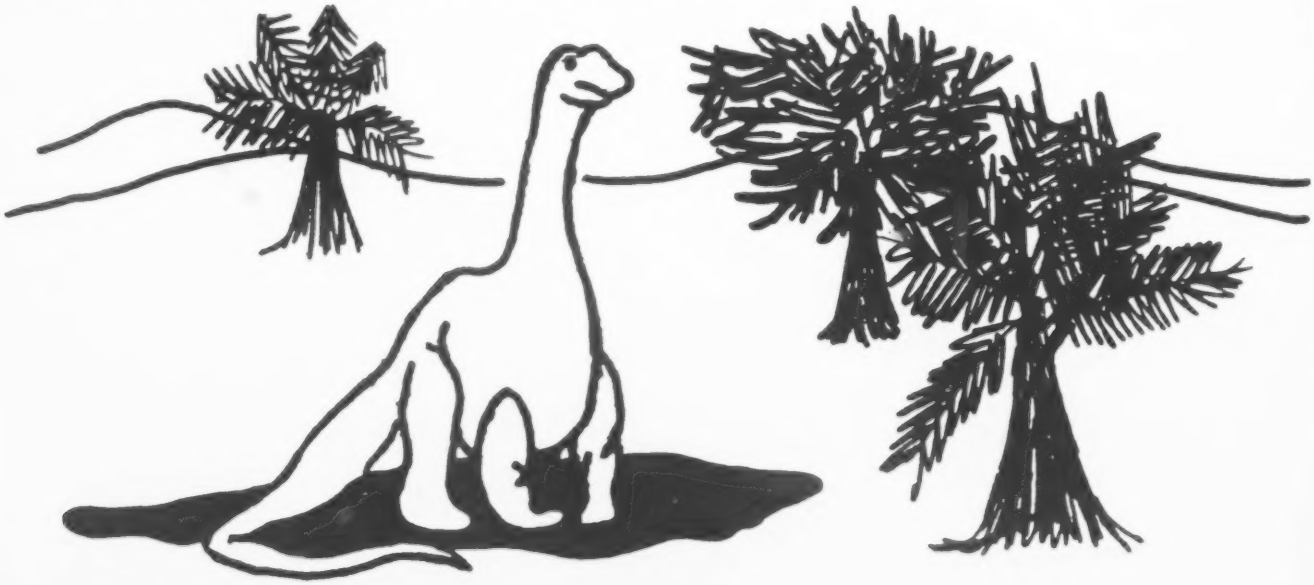
Check out a mask-making book from the library. **Investigate** a variety of ways to make masks. **Choose** the way best suited to your mask design.

DINOSAUR RELIEF

With some friends . . .

DESIGN a big dinosaur on a piece of butcher paper. Draw the side view.

Put another piece of paper under your drawing and cut out your sketch. (You will have 2 cut-outs.)



Paint and decorate your dinosaur. Staple the 2 cut-outs together all around the edges leaving an opening big enough for your hand. **Stuff** torn newspaper through the opening until your dinosaur is full. **Staple** the opening.

When you and your classmates have completed your individual dinosaurs, arrange them all in an interesting composition on the floor.

Staple them to a bulletin board in the same composition. Use paper to make leaves, trees, etc. Staple the foliage around the dinosaurs to complete the stuffed dinosaur relief.